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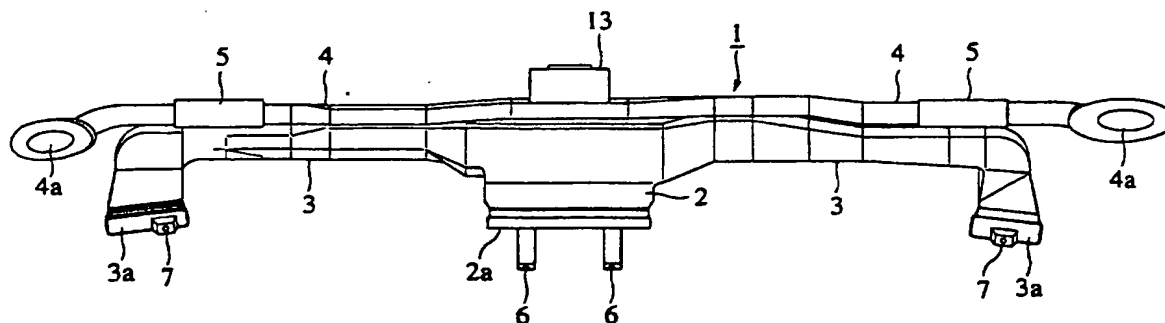
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## (54) Air conditioning duct structure for an automobile

(57) A centre vent duct 2, left and right side vent ducts 3, and left and right side defrost ducts 4 are blow-molded as one body of a plastics material. Both vent ducts 3 and defrost ducts 4 linearly extend to the left and right of the centre vent duct 2. The vent ducts 3 are offset from the defrost ducts 4. Provided with supply openings 4a, respective end portions of the defrost ducts 4 are separated from respective end portions of the vent ducts 3. The end portions of the defrost ducts 4 are provided with bellows 5 allowing adjustment of the position of the supply openings 4a of the defrost ducts 4 relative to side defrost grills of an instrumental panel. Further, each defrost duct 2 includes two flanges near the supply opening for attachment with the instrumental panel and the vent duct; the flanges can be constituted by burrs produced in the blow-molding.

FIG.1



GB 2 302 404 A

FIG.1

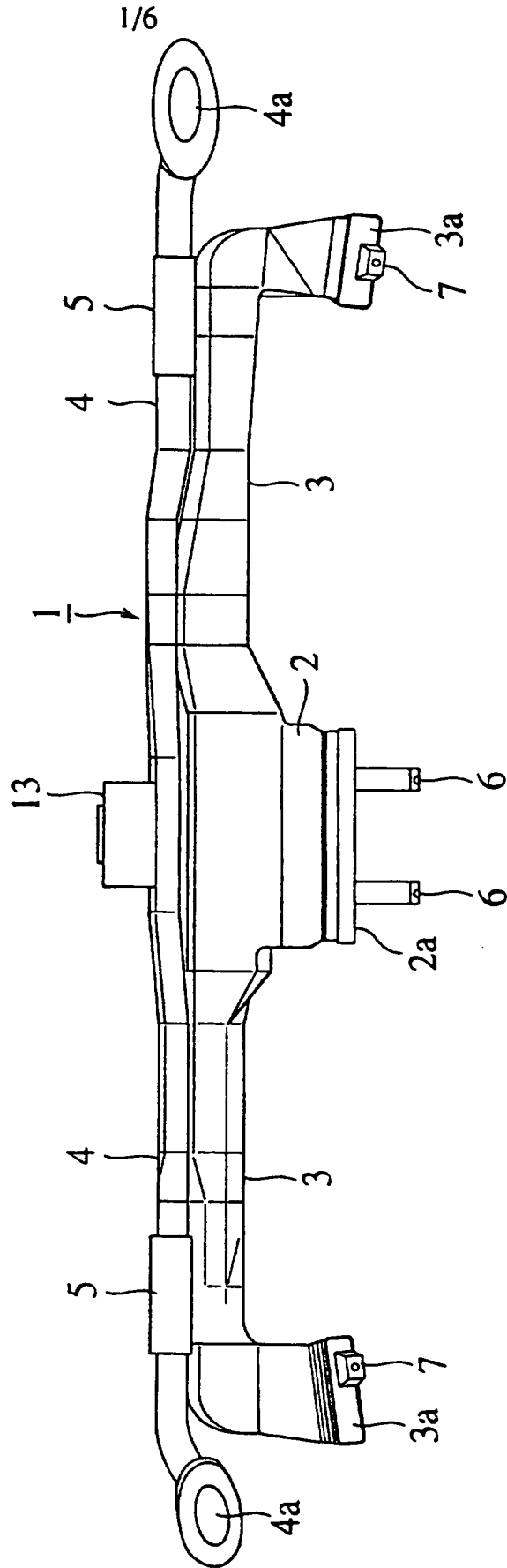




FIG. 2

21

FIG.4

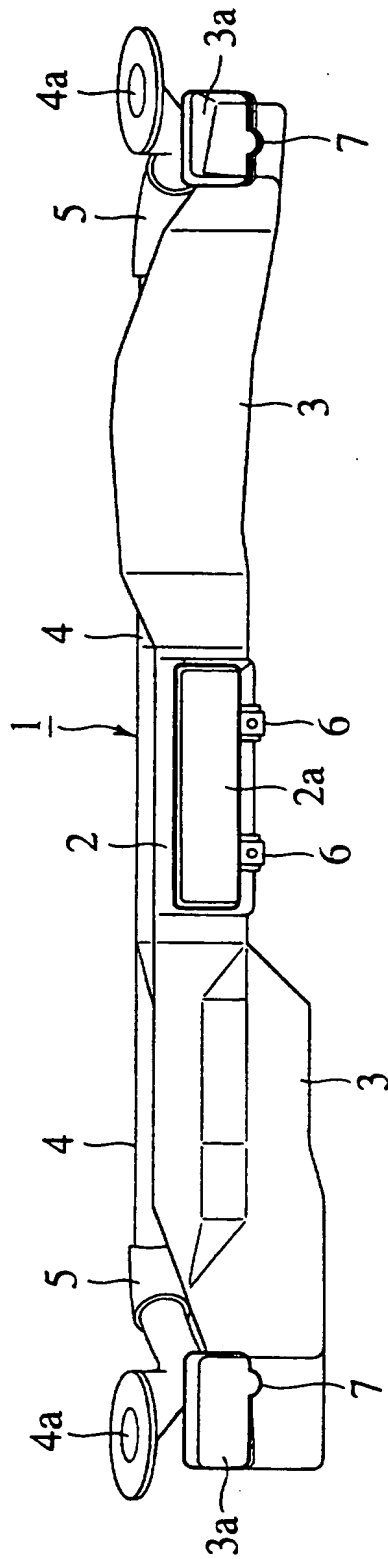


FIG. 5

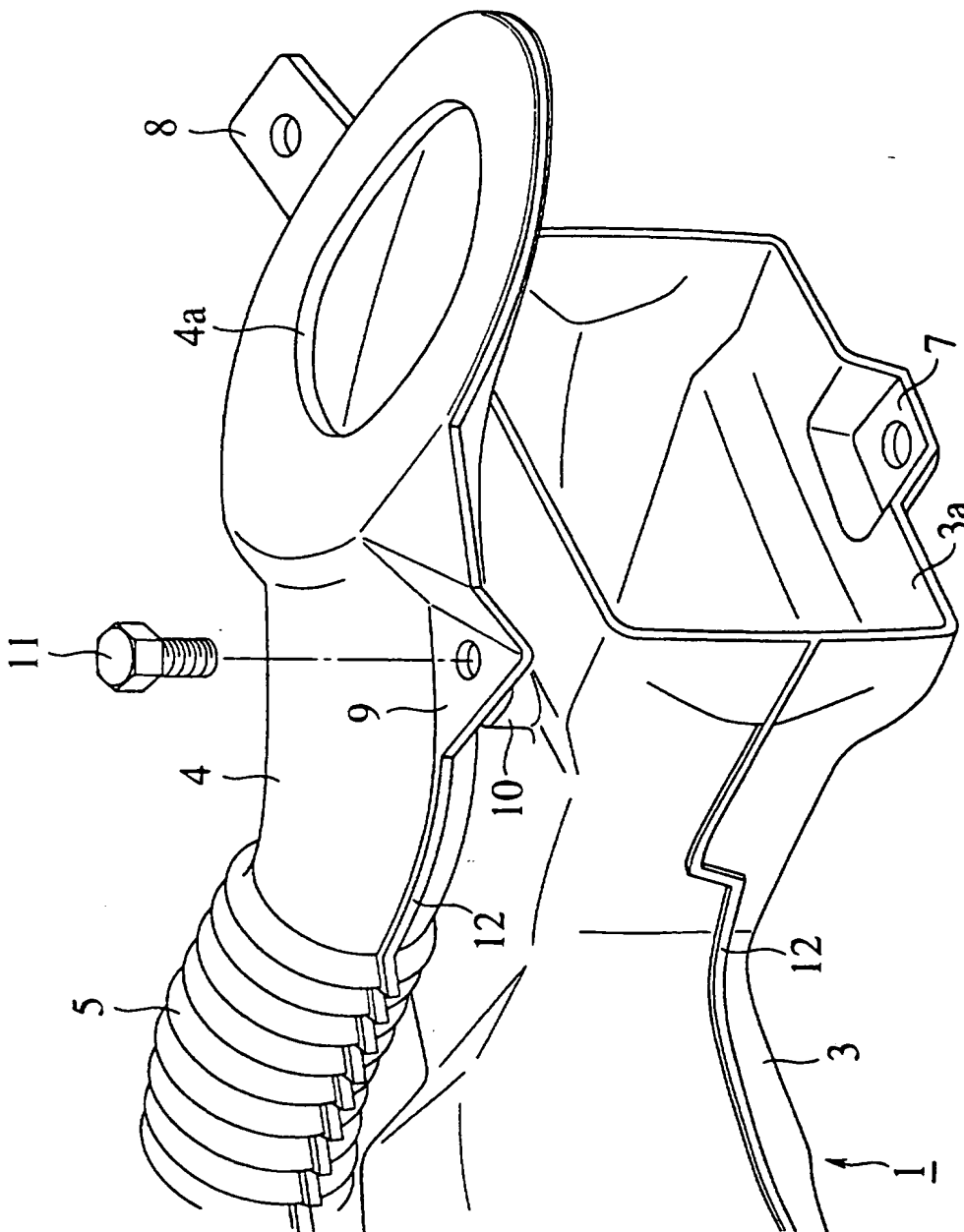
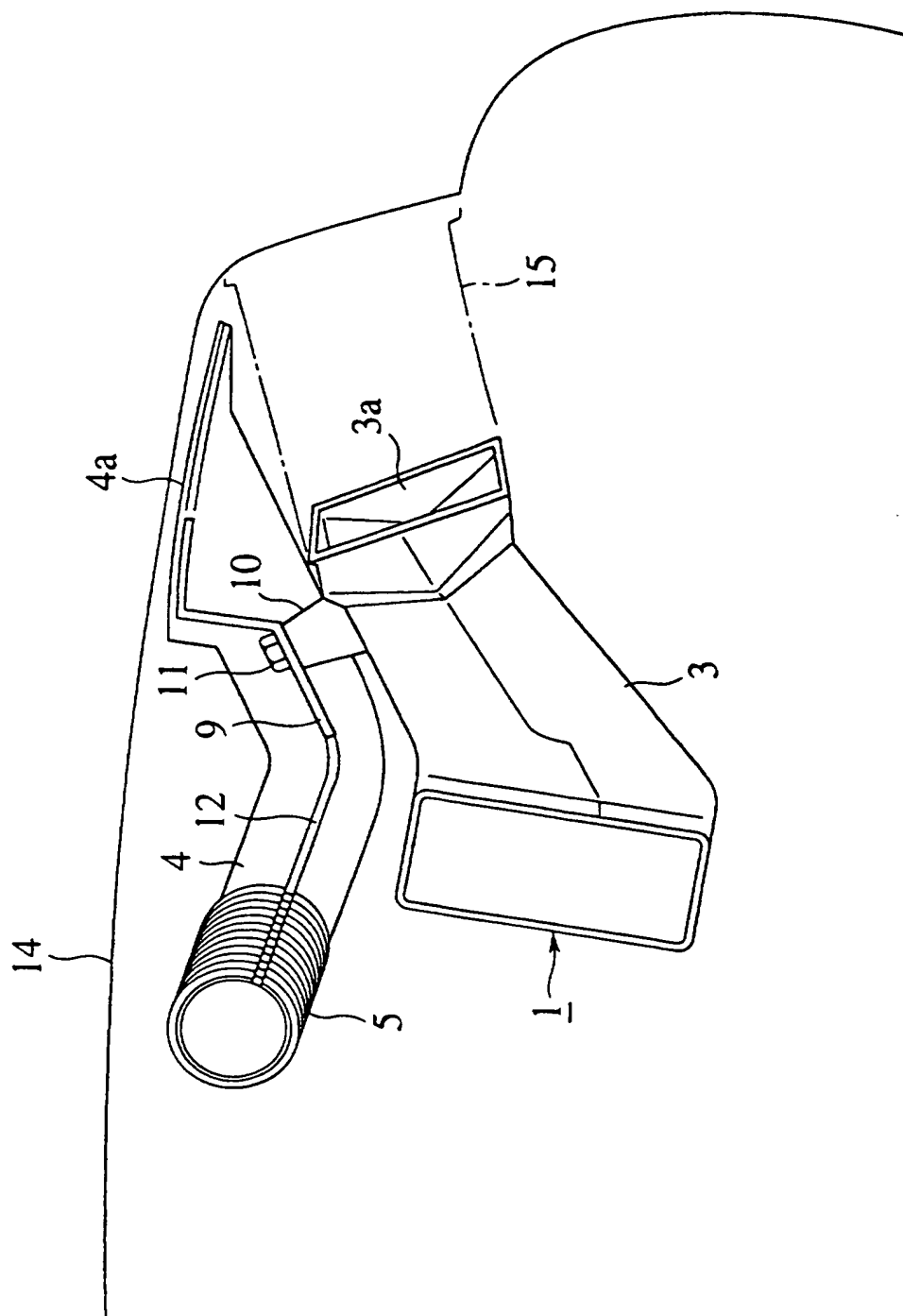


FIG.6



## AIR CONDITIONING DUCT STRUCTURE FOR AUTOMOBILE

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The present invention relates to an air conditioning duct structure, which is to be arranged inside an instrumental panel of an automobile.

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Generally, an air conditioning duct arranged inside the instrumental panel is composed of a center vent duct connected to an air outlet of an air conditioning unit, a pair of left and right side vent ducts, and a pair of left and right side defrost ducts. These ducts are made of non-rubber type resinous material such as polyethylene, polypropylene.

Furthermore, in the Owner's Manual "95' NEON" published by Chrysler Motor Co. Ltd., there is disclosed another air conditioning duct where respective main parts of the center vent duct, the left and right side vent ducts, and the side defrost ducts are molded in a body, while respective end portions of the ducts with supply openings are molded individually, so that the end portions are fittingly connected to the main parts of the center vent duct, the side vent ducts, and the side defrost ducts, respectively.

Providing that, in order to improve the formability of the duct structure and the workability in attaching the duct structure, the center vent duct, the side vent ducts, and the side defrost ducts are blow-molded in a body so that both supply openings of the side vent ducts and supply openings of the side defrost ducts are connected to upper and lower grill sections arranged on the sides of the instrumental panel, it is general that the large supply openings of the side vent ducts offering a large attachment strength are firstly connected to vent grill sections of the instrumental panel and thereafter, the small supply openings of the side



defrost ducts are connected side defrost grill sections of the instrumental panel while adjusting the position of the small supply openings on a basis of the so-connected large supply openings.

5 In the above-mentioned assembling process, however, since each of the non-rubber type plastics ducts exhibits much hardness and less flexibility, it is difficult for a worker to adjust the position of the small supply opening as he wishes.

10 Under these circumstances, even if there is a requirement of integral molding of the side vent ducts and the side defrost ducts, the respective end portions having the supply openings must be molded independently of the respective main parts of the ducts although the main parts can be molded  
15 integral with the center vent duct. That is, it is difficult to mold the side vent ducts and the side defrost ducts in a complete body, so that the formability of the ducts and workability in mounting the ducts on the instrumental panel cannot be improved as used to be.

20

It would therefore be desirable to be able to  
25 provide an air conditioning duct structure for an automobile, which permits molding of the side vent ducts and the side defrost ducts in one body so as to adjust the position of the supply openings of the side defrost ducts, whereby the formability of the ducts and workability in  
30 mounting the ducts on the instrumental panel can be improved.

According to the present invention there is provided an air conditioning duct structure for an automobile, comprising:

35 a center vent duct;

a side vent duct formed in integral with said center vent duct so as to linearly extend in a horizontal direction

as a center of said center vent duct, respectively; and

a side defrost duct formed in integral with said center vent duct so as to linearly extend in a horizontal direction as a center of said center vent duct, said side defrost duct being shifted from said side vent duct to either backward or forward direction and having an end portion with a supply opening separated from an end portions of said side vent ducts;

wherein said center vent duct, said side vent duct, and said side defrost duct are blow-molded in one body and made of non-rubber type resinous material;

wherein said side defrost duct include bellows formed in the vicinity of said end portion of said defrost duct, whereby it is possible to shift the position of said supply opening of said side defrost duct to any direction of the backward, forward, upward, and downward directions.

With the arrangement of the side vent ducts, the side defrost ducts, and the center vent ducts, all of which are blow-molded in one body, it is possible to improve the formability (moldability) of the duct structure and the workability in attaching the duct structure inside the instrumental panel, because there is no need to connect the duct elements with each other.

Although it is impossible to twist the end portions of the side defrost ducts, in view of its physical property, the bellows allows the end portions to be deformed to any direction of the upward, downward, backward, and forward directions, thereby to adjust the position of the supply openings to the side defrost grill of the instrumental panel freely.

In the present invention, preferably, the end portions of the side vent duct is bent downwardly in the vicinity of the bellows of the side defrost duct.

With the above-mentioned arrangement, when bending the end portions of the side defrost ducts to any direction of the upward, downward, backward, and forward directions by means of the bellows, it is possible to avoid

interference of the end portions of the side defrost ducts with the end portions of the side vent ducts, so that the position of the supply openings of the side defrost ducts can be adjusted easily.

5        More preferably, the side defrost duct has a first flange formed in the vicinity of the supply opening for attachment with the instrumental panel and the first flange is formed as a part of burrs produced in the blow-molding.

10        This effective use of burrs allows the design and molding of the end portions of the side defrost ducts to be facilitated. In addition, it is possible to reduce the manufacturing cost of the structure of the side defrost ducts to be fixed on the instrumental panel because of its saving for material.

15        Again, it is preferable that side defrost duct has a further second flange formed in the vicinity of the supply opening for attachment with the side vent duct and the second flange is also formed as a part of burrs produced in the blow-molding.

20        Also in this case, this effective use of burrs allows the design and molding of the end portions of the side defrost ducts to be facilitated. In addition, it is possible to reduce the manufacturing cost of the structure of the side defrost ducts to be fixed on the side vent ducts because of its saving for material.

25        Further, since the end portions of the side defrost ducts are fixed on the end portions of the side vent ducts through the first and second flanges, it is possible to prevent occurrence of frictional noise between the end portions of the side defrost ducts and the side vent ducts, originating in vibrations of a vehicle during traveling, so that the quality and reliability of the structure can be progressed.

30        The above and other features and advantages of this invention will become apparent, and the invention itself will best be understood, from a study of the following description and appended claims, with reference had to the

attached drawings showing a preferred embodiment of the invention.

## 5 BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a plan view showing an air conditioning duct structure in accordance with an embodiment of the present invention;

10 Fig. 2 is a front view of the air conditioning duct structure of Fig. 1;

Fig. 3 is a plan view of the air conditioning duct structure of Fig. 1, showing a condition that end portions of side defrost ducts of the structure are bent;

15 Fig. 4 is a front view of Fig. 3;

Fig. 5 is a perspective view showing a positional relationship between an end portion of a side vent duct and an end portion of the side defrost duct of the structure of Fig. 3; and

20 Fig. 6 is a side view of Fig. 5.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

25 An embodiment of the present invention will be described with reference to the drawings. In Figs. 1 to 6, reference numeral 1 designates a duct unit which is to be arranged inside an instrumental panel 14 and which comprises a center vent duct 2, a pair of left and right side vent  
30 ducts 3, and a pair of left and right side defrost ducts 4, all of which are made of non-rubber resinous material such as polyethylene, polypropylene. In molding, the side vent ducts 3 and the side defrost ducts 4 are blow-molded integrally with the center vent duct 2 so as to  
35 extend in the left and right directions linearly as a center of the duct 2. Further, the left and right side defrost ducts 4 are arranged behind the side vent ducts 3.

Each of the side vent ducts 3 has an end portion which is bent to the rear side of the vehicle at substantial right angles, providing a supply opening 3a facing rearwardly, which is similar to a supply opening 2a of the center vent duct 2.

Being separated from the so-formed end portions of the side vent ducts 3, respective end portions of the side defrost ducts 4 are formed so as to extend from the end portions of the ducts 3 laterally and incline somewhat upwardly, providing supply openings 4a facing upwards.

Formed in the vicinity of the so-formed end portions of the side defrost ducts 4 are respective bellows 5, each of which allows the position of the adjacent supply opening 4a to be adjusted to any one direction of the backward, forward, upward, and downward directions.

As shown in Fig. 2, in the vicinity of the bellows 5 of the side defrost ducts 4, the end portions of the side vent ducts 3 are bent below the end portions of the side defrost ducts 4.

The center vent duct 2 is provided with a pair of left and right brackets 6, which project from a lower edge of the supply opening 2a, while the supply openings 3a, of the side defrost ducts 3, are provided on respective lower edges thereof with attachment seats 7.

According to the embodiment, the so-constructed duct unit 1 is associated with the instrumental panel 14 in a manner that the large supply opening 2a fits with a not-shown center vent grill of the panel 14 through the brackets 6, while the large supply openings 3a fit with side vent grills 15 (Fig. 6) of the panel 14 through the attachment seats 7, by means of bolts/nuts. In this way, it is possible to ensure a large mounting strength between the duct unit 1 and the instrumental panel 14.

As shown in Fig. 5, each of the side defrost ducts 4 has a flange 8 formed on the periphery of the supply openings 4a for attachment with the instrumental panel 14. In order to fix the end portions of the side defrost ducts

4 on the end portions of the side vent ducts 3,  
respectively, each of the side defrost ducts 4 further  
includes a flange 9 which is formed so as to extend from the  
opposite side of the flange 8 toward a cylindrical portion  
5 of the side defrost duct 4.

In fixing, each flange 9 is secured on a boss part 10  
projecting from the top wall of the end portion of the side  
vent duct 3 by screwing a bolt 11, so that the end portion  
of the duct 4 can be integrated with the end portion of the  
10 ducts 3. Thereafter, the end portions of the side defrost  
ducts 4 will be attached to the instrumental panel 14  
through the attachment flanges 8.

According to the embodiment, the above-mentioned  
attachment flanges 8 and 9 are provided by effectively  
15 using burrs 12 which have been produced between molding dies  
(not shown) in the previous blow-molding. That is, it should  
be noted that the flanges 8, 9 can be obtained by removing  
the burrs 12 imperfectly in the trimming process after the  
blow-molding process.

20 Formed integral with the side defrost ducts 4,  
therebetween, is a center defrost connecting part 13 to which  
an end of a not-shown center defrost nozzle attached on the  
instrumental panel 14 is to be fitted.

When the duct unit 1 is fixed on the back of the  
25 instrumental panel 14, the brackets 6 projecting from the  
supply opening 2a are connected to the above-mentioned  
center vent grill at the center of the panel 14 by  
tightening bolts and nuts, while the attachment seats 7  
of the supply openings 3a, of the side vent ducts 3,  
30 are connected to the side vent grills 15 by tightening bolts  
and nuts.

Next, on a basis of the fixed portions of the large  
supply openings 3a, of the side vent ducts 3, offering  
the large mounting strength, the supply openings 4a, of  
35 the side defrost ducts 4, are connected to not-shown side  
defrost grills positioned on the upside of the side vent  
grills 15, respectively. According to the embodiment, owing

to the provision of the bellows 5, it is possible for a worker to easily adjust the position of the supply openings 4a to the side defrost grills by bending the end portions of the side defrost ducts 4 backwardly and downwardly as shown in Figs. 3 to 6. After adjusting the supply openings 4a to the side defrost grills appropriately, the attachment flanges 9 will be fixed on the boss parts 10, by screwing the bolts 11, while the attachment flanges 8 will be fastened to the side defrost grill by means of bolts/nuts.

Furthermore, according to the embodiment, since the duct unit 1 includes the center vent duct 2, the side vent ducts 3, and the side defrost ducts 4, all of which are blow-molded in one body, such a duct structure allows the molding process to be facilitated and allows the formability of the duct unit 1 to be improved remarkably in comparison with the conventional duct structure where each of the duct elements are molded individually. In addition, it is possible to omit work for connecting the duct elements with each other, so that the workability in mounting the duct unit on the instrumental panel 14 can be improved.

Providing that the supply openings 3a of the side vent ducts 3 are fixed on the instrumental panel 14 and even when the supply openings 4a of the side defrost ducts 4 are fixed on the instrumental panel 14 on the basis of such-fixed supply openings 3a, the bellows 5 allow the position of the supply openings 4a to be adjusted in any directions (upward, downward, back and forth) easily. Thus, it is possible to align the openings 4a with the side defrost grill properly and to connect them thereto, whereby the workability in attaching the side defrost ducts can be improved.

Particularly, since the end portions of the side defrost ducts 4 are fixed on the boss parts 10, at the respective ends of the side vent ducts 3, by using the bolts 11, through the intermediary of the attachment flanges 9, it is possible to exclude occurrence of

frictional noise of the end portions of the ducts 3 and 4, which would be caused by vibrations of the traveling vehicle.

Furthermore, since each of the attachment flanges 9 and 8 is formed as a part of the burrs 12 produced between the molding dies in blow-molding the duct unit 1, the design and molding of the end portions of the side defrost ducts 4 can be facilitated and it is possible to reduce the manufacturing cost of the end structure of ducts 4 and 3 because of its saving for material.

Finally, it will be understood by those skilled in the art that the foregoing description is one preferred embodiment of the disclosed duct structure, and that various changes and modifications may be made to the present invention without departing from the scope thereof.



CLAIMS:

1. An air conditioning duct structure for an automobile, comprising a side vent duct and a side defrost duct, both integral with a main vent duct and extending sideways therefrom, the side defrost duct and the side vent duct being arranged one behind the other and having respective separate end portions with respective supply openings;

wherein the said ducts are constituted by a blow-molded body made of non-rubber type plastic material; and

wherein the side defrost duct includes bellows formed in the vicinity of its end portion to allow the supply opening of the side defrost duct to be shifted backwards, forwards, upwards, and downwards.

2. An air conditioning duct structure as claimed in claim 1, wherein the end portion of the side vent duct is bent downwardly in the vicinity of the bellows of the side defrost duct.

3. An air conditioning duct structure as claimed in claim 1 or 2, wherein the side defrost duct has a flange formed in the vicinity of its supply opening for attachment with an instrumental panel, the flange being constituted by part of a burr produced in blow-molding.

4. An air conditioning duct structure as claimed in any of claims 1 to 3, wherein the side defrost duct has a flange formed in the vicinity of its supply opening for attachment with the side vent duct, the flange being constituted by part of a burr produced in blow-molding.

5. An air conditioning duct structure substantially as described with reference to, and as shown in, the accompanying drawings.

6. An automobile having an instrument panel provided with an air conditioning duct structure according to any preceding claim.



Application No: GB 9612086.0  
Claims searched: 1 to 6

Examiner: Paul Makin  
Date of search: 11 September 1996

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): F4V (VGBR)

Int Cl (Ed.6): B60H 1/24, 1/26 ; F24F 13/02

Other: Online : WPI

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
A	US 4766805 (SATO et al) See Figure 2	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.